

10/10/2017 "Life is a journey, not a destination." -Steven Tyler

HW: "2017 A2 CC Properties of Exponents" #4, 6, 8, 14, 18, 20, 22, 27, 35, 38
Test 2 on Monday 10/16

AIM: Properties of Exponents?

Warm Up:

Name of Rule	Algebraic Rule	Rule In Words	Example
Product Rule	$a^m \cdot a^n = a^{m+n}$	When multiplying with exponential notation, if the bases are the same, keep the base and add the exponents.	$5^6 \cdot 5^3 = 5^{6+3} = 5^9$ $4^5 \cdot 4^{-2} = 4^{5+(-2)} = 4^3$
Quotient Rule	$\frac{a^m}{a^n} = a^{m-n}$ $(x^3)^2 = x^3 \cdot x^3 = x^6$	When dividing with exponential notation, if the bases are the same, keep the base and subtract the exponent of the denominator from the exponent of the numerator.	$\frac{m^5}{m^{-4}} = m^{5-(-4)} = m^{5+4} = m^9$
Power Rule	$(a^m)^n = a^{mn}$	To raise a power to a power, multiply the exponents.	$(y^{-3})^{-7} = y^{(-3)(-7)} = y^{21}$
Raising a Product to a Power	$(ab)^n = a^n b^n$	To raise a product to the n th power, raise each factor to the n th power.	$(3x^3y^4)^2$ means $(3^1x^3y^4)^2$ $= 3^2(x^3)^2(y^4)^2$ $= 9x^6y^8$
Raising a Quotient to a Power	$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	To raise a quotient to the n th power, raise both the numerator and the denominator to the n th power.	$\left(\frac{-3}{b^5}\right)^3 = \frac{(-3)^3}{(b^5)^3} = \frac{-27}{b^{15}}$
Exponent of 1	$a^1 = a$	Any number raised to the first power yields the original number.	$x^1 = x$, $7^1 = 7$
Exponent of 0 (zero)	$a^0 = 1$, $a \neq 0$	Any non-zero number raised to the zero power yields 1. 0^0 is undefined.	$(5x)^0 = 1$, $397^0 = 1$
Negative Integers as Exponents	$a^{-n} = \frac{1}{a^n}$	Any number raised to a negative exponent is the same as the reciprocal of that number raised to the opposite exponent.	$5x^{-3} = \frac{5}{x^3}$ $\frac{1}{n^{-7}} = \frac{n^7}{1}$

Simplify:

2. $4x^3 \cdot 2x^3$

$$8x^6$$

$$\frac{x^5}{x^3} = x^2$$

5. $\frac{6^5}{6^3} = 6^2 = 36$

8. $-(9x)^0$
 -1

10. $(x^2y)^4$

$$(x^2)^4 \cdot y^4$$

$$x^8 y^4$$

13. $(2cd^4)^2 (cd)^5$

$$2^2 c^2 (d^4)^2 c^5 d^5$$

$$4c^2 d^8 \cdot c^5 d^5$$

$$4c^7 d^{13}$$

17. $\left(\frac{4x^5y}{16xy^4}\right)^3$

$$\left(\frac{x^4 y^3}{4 y^3}\right)^3 = \frac{x^{12}}{4^3 y^9} = \frac{x^{12}}{64 y^9}$$

19. $\frac{y^{-7}}{1} = \frac{1}{y^7}$

21. $\frac{1}{x^{-5}} = \frac{x^5}{1} = x^5$

$$25. x^9 \cdot x^{-7} = \boxed{x^2}$$

$$28. \frac{52x^6}{13x^{-7}} = \frac{4x^{13}}{1} = \boxed{4x^{13}}$$

$$33. (2x^3y^{-3})^{-2}$$

$$\begin{aligned} & 2^{-2} (x^3)^{-2} (y^{-3})^{-2} \\ & \frac{2^{-2} x^{-6} y^6}{1} = \frac{y^6}{2^2 x^6} \\ & = \frac{y^6}{4x^6} \end{aligned}$$

$$37. \left(\frac{-7a^2b^3c^0}{3a^3b^4c^3} \right)^{-4}$$

$$\left(\frac{-7}{3abc^3} \right)^{-4}$$

$$\left(\frac{3abc^3}{-7} \right)^4$$

$$\frac{3^4 a^4 b^4 c^{12}}{(-7)^4}$$

$$\frac{81a^4b^4c^{12}}{2401}$$

⊛ Fraction to a negative power, flip the fraction and make the power positive.